



## CLEANUP – CLEAN AIR

### DIESEL EMISSIONS & GREENHOUSE GAS REDUCTIONS

# Clean Diesel Technologies & Alternative Fuels at Brownfields Cleanup & Redevelopment Sites

## How can Brownfields Reduce Diesel Pollution?

**RETROFIT** engines with emission control technologies

**MAINTAIN** in accordance with engine manual (i.e., change air filters, check engine timing, fuel injectors and pumps)

**REFUEL** with biodiesel, other alternative fuels, or with cleaner fuels such as ultra-low-sulfur diesel (ULSD)

**MODIFY OPERATIONS** by reducing operating and idle time

**REPLACE** existing engines with new cleaner diesel engines, hybrid engines, or engines compatible with alternative fuels

## Calculate Emissions Reductions

The Quantifier

<http://cfpub.epa.gov/quantifier/>



## Why Use Clean Diesel Equipment?

- Exposure to diesel emissions such as particulate matter (PM) can have serious health effects, e.g. asthma attacks, heart attacks.
- Diesel exhaust is a “likely human carcinogen.”
- Exposure to diesel emissions is of concern for site workers and surrounding communities.
- Diesel engines emit hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>) which contribute to smog, and carbon monoxide (CO), a poisonous gas.

## What are Some Retrofit Options?

The most common options are Diesel Particulate Filters (DPFs) and Diesel Oxidation Catalysts (DOCs), both of which fit on engines like

Retrofit Device	Reductions	Cost per retrofit
DPF	PM 90% HC 90% CO 60-90%	\$7,000 - \$10,000
DOC	PM 20-50% HC 50% CO 40%	\$500 - \$2,000

## What are Some Alternative Fuel Options?

Alternative Fuel	Reductions	Cost per gallon vs. diesel
B20 Biodiesel*	PM 10% CO 11% HC 20% CO <sub>2</sub> 15%	20¢ less – 40¢ more
Emulsified Fuel	PM 16-58% NO <sub>x</sub> 9-20% CO 13%	~ 20¢ more
Natural Gas	PM 99% NO <sub>x</sub> 25-60% CO 90-97% HC 50-75% CO <sub>2</sub> 25%	~\$1 less

\*Blend of 20% biodiesel, 80% diesel. Further research is needed but some studies have shown slight increases in NO<sub>x</sub> emissions compared to diesel.

## Funding Resources

- National Clean Diesel Campaign (EPA) [www.epa.gov/cleandiesel](http://www.epa.gov/cleandiesel)
- Congestion Mitigation and Air Quality Program (CMAQ) [www.fhwa.dot.gov/environment/cmaqpgs/](http://www.fhwa.dot.gov/environment/cmaqpgs/)
- Carl Moyer Program (California only) [www.arb.ca.gov/msprog/moyer/moyer.htm](http://www.arb.ca.gov/msprog/moyer/moyer.htm)

For general information visit:

Cleanup - Clean Air website:

For more information contact:

[www.epa.gov/cleandiesel](http://www.epa.gov/cleandiesel)

[www.epa.gov/region9/cleanup-clean-air](http://www.epa.gov/region9/cleanup-clean-air)

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Sept 2007



## CLEANUP – CLEAN AIR

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# Renewable Energy Technologies at Brownfields Cleanup & Redevelopment Sites

### How can Brownfields Reduce Air Pollution?

**GENERATE** renewable energy on-site

**CONSERVE** energy by using energy efficient equipment and lighting and reducing energy use

**DESIGN GREEN BUILDINGS** to dramatically reduce energy consumption and costs

### Calculate Emissions Reductions

[www.cleanerandgreener.org/resources/emission\\_reductions.htm](http://www.cleanerandgreener.org/resources/emission_reductions.htm)



### What are Renewable Energy Sources?

These sources naturally regenerate energy at the same or greater rate than the energy being consumed. While fossil fuels are being depleted, renewable energy technologies provide a lasting source of energy. They include solar, wind, biomass, hydro, and geothermal sources. Energy from these sources can be used directly or converted into electricity.

### Why Use Renewable Energy Technologies?

- Environmental cleanup systems can operate for years to decades. For longer-term cleanup systems, like groundwater pump-and-treat systems, renewable energy technologies, such as solar panels, can be used to augment the power supply.
- Choose renewable energy technologies for residential or commercial redevelopment projects to generate electricity on-site.
- Using renewable energy technologies reduces pollution and greenhouse gases from the burning of limited fossil fuels.
- Reduce dependence on foreign resources.

### What are Some Renewable Energy Technologies?

**Solar panels** on rooftops can provide a large amount of energy for a home or business and may make the electric meter run backwards; Cost: \$7-\$12 per watt before rebates

**Wind turbines** harness wind energy. A single medium sized wind turbine with good wind conditions can provide enough energy for eight 3-bedroom homes; Cost: \$2,000-\$7,000 per kW (source: [www.windfarmersnetwork.org](http://www.windfarmersnetwork.org))

**Biomass** energy can come from plants or animal manure. Electricity can be generated from methane gas that is produced as the biomass decomposes; Cost: ~ \$4,000 per kW (source: [www.epa.gov/agstar](http://www.epa.gov/agstar))

### Funding Resources

Federal, State, and Local tax credits and rebates are available for energy efficient buildings and/or installation of renewable energy technologies. [www.dsireusa.org](http://www.dsireusa.org)

For general information visit:  
Cleanup - Clean Air website:  
For more information contact:

<a href="http://www.epa.gov/cleanenergy">www.epa.gov/cleanenergy</a>	*	<a href="http://www.nrel.gov">www.nrel.gov</a>	*	<a href="http://www.eere.energy.gov">www.eere.energy.gov</a>
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